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FINAL REPORT OF THE YUKON-CHARLEY RIVER ENTOMOLOGICAL SURVEY (Summer 1975)

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INTRODUCTION

The entomological contributions to the Yukon-Charley River Expedition were of three types: (1) an investigation of the host selection behaviour of alaskan bark beetles, (2) a general entomological survey of insects associated within an Alaskan spruce forest, and (3) a general insect survey of the sage-grass community on the south facing slopes of Kathul Mountain to determine whether there are relict or narrowly distributed insect populations characteristic of this formation. The bark beetle study represented a continuation of promising leads established in the 1973(Noatak River) and 1974(Yukon-Charley)expeditions.

As many of the insects collected during the 1975 field season await final identification from appropriate taxonomists, the results presented below are preliminary. It is anticipated that all insect identifications and related host and range data will be presented at a later date.

ALASKAN SCOLYTID STUDIES

Some of the most devastating insect pests of alaskan white spruce(*Picea glauca*)forests are the bark beetles(Coleoptera: Scolytidae). Recently, as an example, the spruce beetle, *Dendroctonus rufipennis*(Kirby), destroyed over 260,000 acres of white spruce on the Kenai Peninsula(Baker and Kemperman 1974). Although the general taxonomy of arctic scolytids is well known(Wood 1963, Chamberlain 1939, Beckwith 1972), practically nothing is known about their host selection behaviour and population dynamics. Accordingly, in continuation of last summer's scolytid studies, emphasis was placed on the host selection capabilities and opportunistic behaviour of arctic scolytids. This behaviour is in contrast to the more predicted, stereo-typed behaviour of the more temperate scolytids.

Likewise, last summer's studies concerned the biology and behaviour of *D. punctatus*, a rare and poorly studied bark beetle. Emphasis has been placed on this bark beetle as it is almost

taxonomically indistinguisable from D. micans(the sole representative of this genus in Eurasia). Thus, a significant step has been made connecting the Alaskan with the Eurasian insect fauna.

Accordingly, a latin-square trap design was installed in a 150-200 yr. old white spruce stand one half mile east of the mouth of the Kandik River. Last summer(1974), this stand was lightly infested with D. rufipennis and D. punctatus, and other secondary scolytids. In practice, the trapping grid monitored the flight of bark beetles responding to synthetic attractants. Nine traps, consisting of 2.5' x 2.5' plyboardscovered with a gummy adhesive, were positioned on white spruce trees at breast height and spaced 20' apart. Three treatments, with three replications each, were utilized. Each barrier trap was supplied with a 4-dram polyethylene vial which contained one of the following treatments: (1) "Doug-Lure II", a highly attractive compound for the Douglas-Fir beetle(D. pseudotsugae)and thought to be attractive to D. rufipennis, (2) 95% ETOH, a known attractant to some secondary scolytids, and (3)an empty vial as a control. This trapping grid was left in the field throughout the summer and was periodically monitored.

Preliminary trap catches yielded no Dendroctonus species whatsoever. Unfortunately, due to the "late" start of the summer's work, the flight period of this scolytid had terminated; confirming Beckwith's(1972)findings that these beetles fly early in the spring. On the other hand, about 300 other scolytids, mainly Dryocoetes affaber, Polygraphus rufipennis, and Cryphalus ruficollis did respond to the theatments; mainly to the "Doug-Lure II" bait. These findings confirm last summer's work. Of interest is the low level of attractancy of the ETOH bait; which in temperate and tropical zones is highly attractive to secondary scolytids. What possibly might be occuring is the cross attractancy of Dryocoetes, Polygraphus, and Cryphalus to the Dendroctonus produced pheromone. Also of interest was the attraction of a secondary bark beetle, Scolytus piceae, to the Doug-Lure II bait. This apparent cross attractancy is of interest in that

it points out the opportunistic behaviour of Alaskan scolytids as previously demonstrated by Gara and Holsten(1974). With a short developmental period, scolytids must disperse and locate susceptible host material as quick as possible if the bark beetles are to survive. By responding to one another's attractants, the beetles are able to locate susceptible and temporary host material. Such scolytid behaviour is quite uncommon in the lower latitudes.

Another interesting trap catch was 15 specimens of the clerid beelte, Thanasimus undatulus?. This beetle family(Cleridae)is composed of 3,300 species and with very few excpetions, the members of this family are associated with scolytids as predators in both the larval and adult stages(Harwood and Rudinsky 1966). Entomophagous insects have often been considered important factors in reducing or preventing high populations of destructive forest insect pests. Clerids have been attributed in reducing as much as 20% of bark beetle populations. The biology of these bark beetle predators is poorly understood for the Alaskan species involved. Based on preliminary trap data, it appears that these predators are responding to the synthetic bark beetle pheromone(Doug-Lure II)as a prey location strategy. Such a prey location strategy has been demonstrated by Vite and Gara(1962)for the Southern Pine Beetle(D. frontalis)and its clerid predators.

GENERAL SCOLYTID SURVEY

Emphasis was placed on the location and estimation of damage occuring in white spruce as a result of D. rufipennis, D. punctatus, and Ips pertubatus predations.

Kandik River: Little evidence of D. punctatus damage was noted in and around the Kandik River area. Although collected last summer in this area, it was quite scarce. On the other hand, this summer's lack of D. rufipennis was unexpected as it was collected in moderate numbers last summer(1974). Apparently, the decline of this scolytid can be attributed to the paucity of suitable host material(weakened trees)throughout the study

area, and the subsequent dispersal of the beetles into new areas. Of secondary interest though, was the occurence of aborted D. rufipennid galleries. Apparently these scolytids had attacked their host, initiated galleries, but aborted and further development in the host and subsequently re-dispersed. The causal factors associated with such behaviour are yet understood. It is only known that such scolytid behaviour is quite uncommon. In 1974, the occurence of I. pertubatus was relatively low in the Kandik River area. This summer, increased population numbers was observed in all weakened white spruce. This bark beetle has the potential of causing economic dmmage as has been demonstrated in the lower latitudes.

Nation River: A few days were spent investigating the presence of bark beetles along the Nation River. The white spruce along the west bank of the Nation(for four miles from the river mouth) were examined. As with the Kandik River area, very low levels of Dendroctonus were observed. But again, the secondary scolytid, I. pertubatus, was quite common in windthrown and standing(but weakened)spruce. In most cases, those spruce ingested with Ips in the main stem, were likewise infested with Scolytus piceae in the larger branches. Although not encountered along the Nation, S. piceae was observed attacking white spruce regeneration during last summer's field study.

Twin Mtn. and Mt. Catherine: There was little or no evidence of primary or secondary scolytids infesting white or black spruce in these areas. A general survey was made of the high elevation-tree line stands and for the most part, they were free from detrimental insect pests. One exception was the occurence of dipteran cone insects infesting green cones of white spruce in the tree-line stands of the Mt. Catherine study area. Although ptesent, there is little concern as the overall level of infestation was low.

LEPIDOPTERANS

In accordance with the primary objectives of the entomol-

ogical investigations, a collection of the lepidopterans in the study area was undertaken. Due to the late start last summer(1974), very few specimens were collected in the relatively poorly known Yukon-Charley area. To date, more than 15 species of butterflies have been collected; represented by the families: Pieridae, Lycaenidae, Satyridae, Nymphalidae, Papilionidae, and Geometridae. This last family includes the birch leaf roller(Eulype hastata) which is in outbreak conditions throughout most of interior Alaska. Although this moth was encountered in fairly large numbers along the Yukon, from Circle to the Nation River, very little evidence of severe defoliation was noted. It appeared that population levels were declining.

All lepidopterans collected were submitted to Dr. Kenelm Philip of the Alaskan Lepidoptera Survey for final identifications. A final listing of the lepidopterans collected is included at the end of this report. Of upmost importance was the collection(six specimens)of two rare species of butterflies to Alaska(Nymphalidae:Euphydryas anicia, Satyridae:Oeneis chryxus). The Carnegie Museum has O. chryxus and E. anicia, both collected at least 20 years ago from Eagle, Alaska. The American Museum of Natural History has E. anicia, collected from Alfred Creek Camp(Talkeetna Mts.) and a private collector has obtained O. chryxus at Black Rapids on the Richardson Hwy.(Philip-Pers. Commun.). Unfortunately, no host information was listed. Nevertheless, the procurement of these butterfly species, both uncommonly rare, from the sage-grass community of Kathul Mtn. warrants future intensive investigation. Both species were collected in the sage-grass community located on the south facing slope of Kathul Mtn. It is thought(Young-Pers. Commun.)that this sage-grass community represents a steppe-tundra relict. It is felt that some of the insects associated with this plant community are themselves relict or narrowly distributed; thus providing supportive evidence for the "relict" steppe-tundra situation.

Unfortunately, no butterflies were seen in the higher elevation areas near the headwaters of the Charley River. This was to be expected as our arrival in the high country corresponded to the period when most lepidopterans have completed their adult

stage(Downes 1964, Gara and Holsten 1974).

GENERAL COLLECTING

As a continuation of last summer's Yukon-Charley survey, a collection of insects representing different habitats was initiated. From such endeavors, a synoptic insect collection in the proposed park site will be realized. A final listing of the insects and their hosts is presented at the end of this report. Only those insects which were not previously collected in the Yukon-Charley area during the 1974 field season are listed. Consequently, a complete listing of the insects collected in the Yukon-Charley Proposed Wild River Area can be obtained by referring to the lists presented in the 1974 and 1975 final reports.

Of particular interest was the occurence of tiger beetles (Coleoptera:Cicindelidae)along the sandy banks and bluffs near the mouths of the Kandik and Nation Rivers. These predatory ground beetles have not previously been reported from the Nation-Yukon and Kandik-Yukon areas. A new species identification and/or significant range extension is anticipated from these findings.

KATHUL MTN

Four days were spent collecting on the south facing slopes of Kathul Mtn. These slopes are exceedingly dry and are characterized by Artemesia, Populus, and various types of grasses. It is believed that this sage community is a relict of the pre-Pleistocene steppe-tundra conditions covering much of interior Alaska. It would be of interest to determine how many of the insect species present in this area are themselves "relicts" or "recent" immigrants.

As previously mentioned in an earlier section, the occurence of two rare Alaskan butterflies associated with the sage-grass community may support the steppe-tundra relict community on Kathul Mtn. Also of interest was the common occurence of grass-

hoppers, Melanoplus spp., in the sage-grass community. Due to their large numbers, Melanoplus is more than likely an important herbivore of this community. Likewise, a large number of hemipterans were collected by sweeping through the sage-grass communities of Kathul Mtn. Unfortunately, both the grasshoppers and hemipterans are still being identified. Upon receipt of the final identifications, the information will be submitted.

TABLE 1

Entomological Survey

Insects collected during the 1975 expedition that were not previously collected were as follows:

ORDER	SPECIES	STAGE[1]	LOCATION	HOST
Coleoptera				
Scolytidae:	Cryphalus ruficollis	A	Kandik R.	Picea glauca
Cleridae:	Thanasimus undulatus	A	"	"
Carabidae:	Carabus vietinghoffi[2] Adams.	A	"	under rock
	Nebria gyllenhali[2] Schonherr	A	"	" "
	Opisthius richardsoni[2] Kirby	A	"	" "
	Bembidion petrosum[2] Gebler	A	"	" "
Cerambycidae:	Phymatodes dimidiatus (Kirby)	A	"	P. glauca
	Tetropium cinnamopterum parvulum Casey	A	"	" "
	Pogonocherus penicillatus LeC.	A	"	" "
	Meriellum proteus[3] (Kirby)	A	"	" "
	Saperda concolor LeC.	A	"	Salix spp.
Cicindelidae:	Cicindela spp.	A	Kandik R. Nation R.	River bank
Lepidoptera				
Pieridae:	Pieris napi	A	Kathul Mtn.	
	Colias philodice	A	" "	
	C. gigantea?	A	" "	
	C. hecla	A	Nation R.	
Papilionidae:	Papilio glaucas	A	Kathul Mtn.	
Lycaenidae:	Everes amyntula	A	" "	
	Agriades aguilo	A	" "	
Nymphalidae:	Limenitis arthemis	A	" "	

1 Stage: L= larva, A= adult, E= egg, P= pupa, N= nymph

Data?

ORDER	SPECIES	STAGE	LOCATION	HOST
Nymphalidae:	Phyciodes campestris	A	Kathul Mtn.	
	Boloria eunomia	A	Kandik R.	
	B. freija	A	Kathul Mtn.	
	B. distincta	A	" "	
Satyridae:	Euphydryas anicia	A	" "	
	Oeneis chryxus	A	" "	
	O. bore	A	Kandik R.	
	O. jutta	A	" "	
	Erebia theano	A	Kathul Mtn.	
	E. epipsodea	A	" "	
	Coenonympha mixturata	A	Kandik R.	
	Parasemia plantaginis	A	" "	

Orthoptera: See next page →

2--C. vietinghoffi is a tundra-subarctic forest inhabitant ranging from the Venissei River in the USSR, eastward to Bathurst Inlet and southward to Norman Wells, along the MacKenzie River(Ball-Pers. Commun.)

N. gyllenhali is a circumpolar species, represented on the tundra and in forested areas; ranging southward in the Rockies to New Mexico(at high altitudes)(Ball-Pers. Commun.)

O. richardsoni is a western North American riparian species, ranging from Wyoming and Oregon and northward to Southern Alaska(Fort Yukon) (Ball-Pers. Commun)

B. petrosum is a circumpolar species, ranging southward in the Rockies to New Mexico(Ball-Pers. Commun.)

3--M. proteus is a quite rare cerambycid. Two specimens were collected from the Kandik River area and according to Penrose(Pers. Commun.) these are the 3rd and 4th specimens ever collected.

REFERENCES

Baker, B.H. and J.A. Kemperman, 1972; Spruce beetles effects on a white spruce stand in Alaska. J. Forestry 435-440.

Beckwith, R.C., 1972; Scolytid flight in white spruce in Alaska. Can. Entomol. 104:1977-1983.

Chamberlain, W.J., 1939; The bark beetles and timber beetles of North America. Oreg. State Univ. Coop. Assoc., Corvallis, Oreg. 513 p.

Downes, J.A., 1964; Arctic insects and their environment. Can. Entomol. 96:279-307.

Gara, R.I. and E.H. Holsten, 1974;The environment of the Noatak River Basin, Alaska. Contrib. from the Center for Northern Studies No.1:326-353.

Harwood, W.G. and J.A. Rudinsky, 1966; The flight and olfactory behaviour of Checkered Beetles(Coleoptera:Cleridae)predatory on the Douglas-fir beetle. Tech. Bull. No. 95, Agric. Exper. Stat., Oreg. State Univ., Corvallis, Ore. 36 pp.

Vite, J.P. and R.I. Gara, 1962; Volatile attractants from ponderosa pine attacked by bark beetles(Coleoptera:Scolytidae). Contrib. from Boyce Thompson Instit., 21:251-274.

Wood, S.L. 1963; A revision of the bark beetle genus Dendroctonus Erichson(Coleoptera:Scolytidae). The Great Basin Naturalist23: 82-88.

Orthoptera:
Pardalophora apiculata (Harris) Kathul Mtn VIII-6-75
Xanthippus spp. " "
Acrididae
Acridinae - 4 juveniles " "
Cyrtacanthacridinae - 6 juv. " "